

Claims after this response:

1(Currently Amended). An encoder comprising:

a drum comprising a circular cylindrical surface characterized by an axis and a radius of curvature, said drum having a surface with a normal perpendicular to said axis;

a first track comprising a plurality of alternating reflective and non-reflective stripes arranged on said circular cylindrical surface, said reflective stripes comprising a portion of a said circular cylindrical surface, each reflective stripe having a circular cylindrical outer surface having an axis coincident with said axis of said drum;

a first light source ~~for illuminating that illuminates~~ said outer surface of said reflective stripes at an oblique angle relative to said normal; and

a first photodetector positioned to receive light from said light source that is reflected from said reflective stripes of said first track when said drum moves relative to said photodetector, said reflective stripes of said first track forming an image of said first light source on said first photodetector, said image having a magnification that depends on said radius of curvature.

2(Currently Amended). ~~The encoder of Claim 1~~ An encoder comprising:

a drum comprising a circular cylindrical surface characterized by an axis, said drum having a surface with a normal perpendicular to said axis;

a first track comprising a plurality of alternating reflective and non-reflective stripes arranged on said circular cylindrical surface, said reflective stripes comprising a portion of a said circular cylindrical surface;

a first light source that illuminates said stripes at an ~~opaque~~ oblique angle relative to said normal; and

a first photodetector positioned to receive light from said light source that is reflected from said reflective stripes of said first track when said drum moves relative to said photodetector, said reflective stripes of said first track forming an image of said first light source on said first photodetector,

wherein said first light source emits a collimated beam of light;

3(Original). The encoder of Claim 1 wherein said drum rotates about said axis when a shaft is rotated.

4(Original). The encoder of Claim 3 wherein said shaft is coincident with said axis.

5(Previously Presented). The encoder of Claim 1 wherein said circular cylindrical surface lies between said first track and said axis.

6(Previously Presented). The encoder of Claim 1 wherein said first track lies between said circular cylindrical surface and said axis.

7(Previously Presented). The encoder of Claim 1 further comprising:

a second track comprising a plurality of alternating reflective and non-reflective stripes arranged on said circular cylindrical surface;

a second light source for illuminating said stripes of said second track at an oblique angle relative to said normal; and

a second photodetector positioned to receive light from said second light source that is reflected from said reflective stripes of said second track, wherein said drum moves relative to said second photodetector.

8(Original). The encoder of Claim 7, wherein said reflective stripes of said second track have widths that are different from said reflective stripes of said first track.

REMARKS

The Examiner rejected Claims 1 and 5 under 35 U.S.C. 102(e) as being anticipated by Rothamel (US 6,639,206). Applicant submits that these claims as amended above could not be anticipated by Rothamel.

With respect to Claim 1, the Examiner looks to Figure 1 of Rothamel and to the reflectors shown at 2 in that figure. It should be noted that the reflectors shown at 2 are diagrammatic representations of the reflectors, and hence, do not represent the shape of the surface of the reflectors. The details of the surface of the stripes shown in Figure 1 are provided in Figure 3 and the discussion thereof. In particular, Rothamel teaches that the surfaces of the reflectors are planar (col 4, lines 4-16).

In addition, it should be noted that Rothamel teaches that the light source focuses the light onto the mirrors. That is, the light source includes a lens that images the light source onto the mirror.

Claim 1 as amended above makes it clear that the reflective stripes have a circular cylindrical surface and that the image formed by the reflective stripes has a magnification that depends on the radius of curvature of the cylindrical surface. Applicant can not find any such teachings in Rothamel, and hence, Applicant submits that Claim 1, and Claim 5, which depends therefrom, are not anticipated by Rothamel.

The Examiner rejected Claim 2 under 35 U.S.C. 103(a) as being unpatentable over Rothamel in view of Chen (US 6,817,528). Applicant traverses this rejection.

To sustain a rejection under 35 U.S.C. 103, the Examiner must show that the combined references teach each of the elements of the claim or that there is some motivation in the art for altering one of the teachings to arrive at the combined set of teachings. "The mere fact that a reference could be modified to produce the patented invention would not make the modification obvious unless it is suggested by the prior art." (*Libbey-Owens-Ford v. BOC Group*, 4 USPQ 2d 1097, 1103). "When the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or

suggestion appears in the reference" (*In re Rijckaert*, 28 USPQ2d, 1955, 1957). In addition, the Examiner must show that there is some motivation in the art that would cause someone of ordinary skill to combine the references, and that in making the combination, there was a reasonable expectation of success. Where the claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under section 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success... Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *In re Vaack*, 20 USPQ2d 1438, 1442(CAFC 1991).

Regarding Claim 2, the Examiner stated that Rothamel discloses the claimed invention with the exception of the limitation that the light source emits a collimated beam of light. In particular, the Examiner identifies light source 1 shown in Figure 1 as the light source. The Examiner looks to Chen for the missing teaching. According to the Examiner, it would have been obvious to one skilled in the art to provide in Rothamel collimating lenses to collimate light rays for each light source for the purpose of maintaining alignment of the active lighting area with the area of photodetectors during drum rotation.

First, the Examiner has not pointed to any teaching as to how the replacement of the light source 1 taught in Rothamel would lead to maintaining the alignment of the active lighting areas taught in Rothamel with the photodetectors during drum rotation.

Second, Applicant must point out that Rothamel specifically teaches that the light source generates a focused beam of light such that the light emitter in the light source is focused onto the surface of the planar mirror. The scheme taught in Rothamel depends on the focusing of the light on the mirror. Hence, replacing light source 1 with a light source that generates a collimated beam of light would render the invention of Rothamel inoperative. Accordingly, there is no reasonable expectation of success in making the combination suggested by the Examiner.

The Examiner rejected Claims 3 and 4 under 35 U.S.C. 103(a) as being unpatentable over Rothamel in view of Suganuma (US 6,448,996). Applicant submits that these claims as amended above are not obvious in view of these references. Applicant repeats the arguments made above with respect to the missing teachings in Rothamel. Suganuma does not provide the missing teachings.

The Examiner rejected Claim 7 under 35 U.S.C. 103(a) as being unpatentable over Rothamel in view of Karim-Panahi (US 5,438,882). Applicant submits that Claim 7 as amended above is not obvious in view of these references. Applicant repeats the arguments made above with reference to the missing teachings in Rothamel. Karim-Panahi does not provide the missing teachings.

The Examiner rejected Claim 8 under 35 U.S.C. 103(a) as being unpatentable over Rothamel in view of Karim-Panahi and Cohen (US 4,124,839). Applicant submits that Claim 8, as amended above, is not anticipated by the cited references and repeats the arguments made above with respect to the missing teachings in the combination of Rothamel and Karim-Panahi. Cohen does not provide the missing teachings.

With respect to Claim 8, the Examiner stated that the combination of Rothamel and Karim-Panahi discloses the claimed invention as stated above, however, this combination does not provide a drum comprising two tracks where the widths of the stripes of the first track are different from the widths of the stripes of the second track. The Examiner looks to Cohen as providing the missing teaching. Specifically, the Examiner maintains that Cohen shows in Fig. 4 a cylindrical drum comprising six encoding tracks (170-180) comprising stripes of varying widths. The Examiner maintains that it would have been obvious to one skilled in the art to modify the combination of Rothamel and Karim-Panahi by placing additional encoding tracks on the cylindrical drum as taught by Cohen for the purpose of providing additional encoding data to the system.

First, the Examiner has not indicated what additional encoding data would be required and why it would be desirable to have such data in the apparatus resulting from the combination of Rothamel and Karim-Panahi.

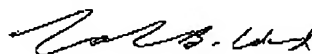
Second, in making this rejection, the Examiner looks to tracks 4 and 4' in Karim-Panahi as the first and second tracks. Basically, the Examiner is arguing that it would be obvious to replace tracks 4 and 4' as taught in Karim-Panahi with the tracks taught in Cohen to arrive at an encoder that meets the limitations of Claim 8. Applicant must point out that the scheme taught in Karim-Panahi is designed to measure the torque on a shaft by measuring the wave number of a torsional wave. The wave number is determined by measuring the phase shift of the signals produced by the two tracks as the shaft is subjected to the torsional wave. As such, signals generated by the tracks in Karim-Panahi must be identical except for a phase shift. Hence, utilizing the different spacings suggested by Cohen would lead to an inoperative device.

The Examiner attempts to overcome this problem by stating that the signal being measured in Karim-Panahi is an angular velocity Ω (distance of rotation per/time division equivalent to angular frequency (revolutions per/time division)) of the shaft and not counted pulses per/time division (col. 4, lines 21-26). Therefore, such tracks need not have markings of the same width or identical bands.

Applicant must disagree with the Examiner's reading of Karim-Panahi. The cited passage refers to the time period between pulses, not to the measurement of angular velocity. Accordingly, Applicant submits that the Examiner has not made a *prima facie* case for obviousness with respect to Claim 8.

I hereby certify that this paper is being sent by FAX to 571-273-8300.

Respectfully Submitted,



Calvin B. Ward
Registration No. 30,896
Date: April 24, 2006

Avago Technologies, LTD.
P.O. Box 1920
Denver, CO 80201-1920

Telephone (925) 855-0413
Telefax (925) 855-9214

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